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<b>From:</b> Dominic M. Kotab		

**Docket No.:** HIT1P006/HSJ920030045US1

**App. No:** 10/602,462

**Total Number of Pages Being Transmitted, Including Cover Sheet:** 31

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March 20, 2006

Practitioner's Docket No. HIT1P006/HSJ920030045US1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**PATENT  
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In re application of: Bedell et al.

Application No.: 10/602,462

Group No.: 2652

Filed: 06/23/2003

Examiner: T. Chen

For: MAGNETIC HEAD COIL SYSTEM AND DAMASCENE/REACTIVE ION ETCHING  
METHOD FOR MANUFACTURING THE SAME

Mail Stop Appeal Briefs – Patents

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

**TRANSMITTAL OF APPEAL BRIEF  
(PATENT APPLICATION—37 C.F.R. § 41.37)**

1. Transmitted herewith, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on January 18, 2006.

2. STATUS OF APPLICANT

This application is on behalf of other than a small entity.

**CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10\****(When using Express Mail, the Express Mail label number is mandatory;  
Express Mail certification is optional.)*

I hereby certify that, on the date shown below, this correspondence is being:

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37 C.F.R. § 1.8(a)

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✓ facsimile transmitted to the Patent and Trademark Office, (571) 273 - 8300.

Date: 3/20/2006

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April Skovmand

(type or print name of person certifying)

\* Only the date of filing (' 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under ' 1.8 continues to be taken into account in determining timeliness. See ' 1.703(f). Consider "Express Mail Post Office to Addressee" (' 1.10) or facsimile transmission (' 1.6(d)) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

Transmittal of Appeal Brief—page 1 of 2

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3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 C.F.R. § 41.20(b)(2), the fee for filing the Appeal Brief is:

other than a small entity \$500.00

**Appeal Brief fee due \$500.00**

4. EXTENSION OF TERM

The proceedings herein are for a patent application and the provisions of 37 C.F.R. § 1.136 apply.

5. TOTAL FEE DUE

The total fee due is:

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Appeal brief fee \$500.00

Extension fee (if any) \$0.00

**TOTAL FEE DUE \$500.00**

6. FEE PAYMENT

Authorization is hereby made to charge the amount of \$500.00 to Deposit Account No. 50-2587 order no. (HSJ920030045US1).

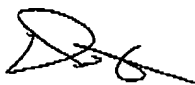
A duplicate of this transmittal is attached.

7. FEE DEFICIENCY

If any additional extension and/or fee is required, and if any additional fee for claims is required, charge Deposit Account No. 50-2587 order no. (HSJ920030045US1).

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\_\_\_\_\_  
Signature of Practitioner  
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USA

Transmittal of Appeal Brief—page 2 of 2

## PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re the application of )  
 )  
Bedell et al. ) Group Art Unit: 2652  
 )  
Application No. 10/602,462 ) Examiner: CHEN, Tianjie  
 )  
Filed: 06/23/2003 ) Attorney Docket No.  
 ) HIT1P006/HSJ9-2003-0045US1  
For: MAGNETIC HEAD COIL SYSTEM )  
AND DAMASCENE/REACTIVE )  
ION ETCHING METHOD FOR ) Date: March 20, 2006  
MANUFACTURING THE SAME )  
\_\_\_\_\_ )

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**ATTENTION: Board of Patent Appeals and Interferences****APPEAL BRIEF (37 C.F.R. § 41.37)**

This brief is in furtherance of the Notice of Appeal, filed in this case on Jan. 18, 2006.

The fees required under § 1.17, and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(i)):

- I REAL PARTY IN INTEREST
- II RELATED APPEALS AND INTERFERENCES
- III STATUS OF CLAIMS
- IV STATUS OF AMENDMENTS

Appeal Brief--page 1 of 26

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- V SUMMARY OF CLAIMED SUBJECT MATTER
- VI GROUNDS OF REJECTION PRESENTED FOR REVIEW
- VII ARGUMENTS
- VIII APPENDIX OF CLAIMS INVOLVED IN THE APPEAL
- IX APPENDIX LISTING ANY EVIDENCE RELIED ON BY THE APPELLANT IN  
THE APPEAL

The final page of this brief bears the practitioner's signature.

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**I REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))**

The real party in interest in this appeal is Hitachi Global Storage Technologies Netherlands B.V.

**II RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c) (1)(ii))**

With respect to other prior or pending appeals, interferences, or related judicial proceedings that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal, there is no such prior or pending appeals, interferences, or related judicial proceedings.

Since no such proceedings exist, no Related Proceedings Appendix is appended hereto.

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**III STATUS OF CLAIMS (37 C.F.R. § 41.37(c) (1)(iii))****A. TOTAL NUMBER OF CLAIMS IN APPLICATION****BEST AVAILABLE COPY**

Claims in the application are: 1-37

**B. STATUS OF ALL THE CLAIMS IN APPLICATION**

1. Claims pending: 1-37
2. Claims withdrawn from consideration: 1-24
3. Claims allowed: None
4. Claims rejected: 25-37

**C. CLAIMS ON APPEAL**

The claims on appeal are: 25-37

See additional status information in the Appendix of Claims.



**IV STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))**

As to the status of any amendment filed subsequent to final rejection, no amendments were submitted after final rejection.

**BEST AVAILABLE COPY****V SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))**

With respect to a summary of independent Claim 25, a magnetic head is claimed. *See* element 480 of FIG. 4F and element 321 of FIG. 3. Referring to FIG. 4E, the claimed head includes an insulating layer (402) and a photoresist layer (404) positioned adjacent the insulating layer for defining at least one channel (412). *See also* p. 10, lines 10-11. A coil structure (422) is defined by a conductive material (414) situated in the at least one channel. *See also* p. 11, lines 2-3. A profile of the channel includes a first segment (430) defining a first angle and a second segment (432) continuous with the first segment, the second segment defining a second angle, the second angle being different than the first angle. *See also* p. 11, lines 1-15.

With respect to a summary of Claim 31, the description of parent Claim 25 (above) is incorporated herein. As shown in FIG. 4E of the present application, the first segment (430) of the channel (412) is positioned below the second segment (432) of the channel. The second segment defines an angle that is substantially vertical, and between 80 and 90 degrees. The first segment defines an angle that is between 70 and 85 degrees.

With respect to a summary of Claim 35, the description of parent Claim 25 (above) is incorporated herein. As shown in FIG. 4E of the present application, an aspect ratio of the channel (412) and coil structure (422) is at least 2.5.

With respect to a summary of independent Claim 36, a magnetic head manufactured utilizing a process is claimed. *See* FIG. 4 and p. 7, line 19 to p. 10, line 2. The process comprises depositing an insulating layer (operation 452); depositing a photoresist layer on the insulating layer (operation 454); depositing a silicon dielectric layer on the photoresist layer (operation 456); masking the silicon dielectric layer (operation 458); reactive ion etching a plurality of channels in the silicon dielectric layer using  $\text{CF}_4/\text{CHF}_3$  chemistry (operation 460 and p. 9, lines 4-5); reactive ion etching a plurality of channels in the photoresist layer and the silicon dielectric layer, wherein the channels each include a first segment defining a first angle and a second segment defining a second angle, the first and second segments being contiguous wherein a

H<sub>2</sub>/N<sub>2</sub>/CH<sub>3</sub>F/C<sub>2</sub>H<sub>4</sub> reducing chemistry is utilized in channel formation (operation 462 and p. 9, lines 5-10); depositing a conductive seed layer in the channels (operation 464); electroplating the channels with a conductive material to define a coil structure (operation 466); and chemical-mechanical polishing the conductive material and the conductive seed layer for the planarizing thereof (operation 468).

With respect to a summary of independent Claim 37, a disk drive system is claimed. *See* FIG. 3. As shown in FIG. 3, the system includes a magnetic recording disk (312) and a magnetic head (321). Referring to FIG. 4E, the claimed head includes an insulating layer (402) and a photoresist layer (404) positioned adjacent the insulating layer for defining at least one channel (412). *See also* p. 10, lines 10-11. A coil structure (422) is defined by a conductive material (414) situated in the channel. *See also* p. 11, lines 2-3. The channel and coil structure include a first segment (430) defining a first angle and a second segment (432) defining a second angle, the first and second segments being contiguous. *See also* p. 11, lines 1-15. Referring again to FIG. 3, the system also includes an actuator (319) for moving the magnetic head across the magnetic recording disk so the magnetic head may access different regions of the magnetic recording disk, and a controller (329) electrically coupled to the magnetic head.

**VI GROUNDS OF REJECTION PRESENTED FOR REVIEW (37 C.F.R. §  
41.37(c)(1)(vi))**

Following, under each issue listed, is a concise statement setting forth the corresponding ground of rejection.

Issue # 1: Claims 25-34, 36 and 37 have been rejected under 35 USC 102(e) as being anticipated by Rose et al. (US 2001/0013991).

Issue # 2: Claim 35 has been rejected under 35 USC 103(a) as being unpatentable over the combination of Rose et al. with Hsiao et al. (US 6,570,739).

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**VII ARGUMENTS (37 C.F.R. § 41.37(c)(1)(vii))**

The claims of the groups noted below do not stand or fall together. In the present section, appellant explains why the claims of each group are believed to be separately patentable.

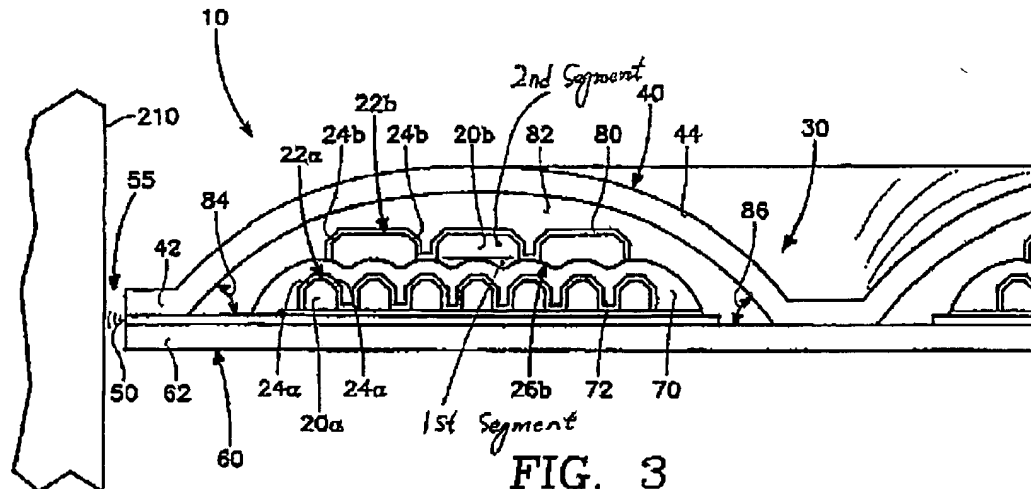
**Issue #1:**

Issue # 1: Claims 25-34, 36 and 37 have been rejected under 35 USC 102(e) as being anticipated by Rose et al. (US 2001/0013991) [hereinafter "Rose"].

**Group #1: Claims 25-30, 32-34, 36 and 37**

In the final office action dated 10/03/2005, claim 25 was rejected under 35 USC 102(e) as being anticipated by Rose. Applicants respectfully disagree that Rose teaches each and every limitation of independent claim 25 and its dependent claims 26-30 and 32-34. Applicants also respectfully disagree that Rose teaches each and every limitation of independent claims 36 and 37.

The rejection of claim 25 relies primarily on FIG. 3 of Rose to show all of the claimed features. A version of Rose's FIG. 3 from the Office Action dated Oct. 3, 2005 is reproduced below. The markings were made by the Examiner.



Claim 25 requires a photoresist layer positioned adjacent an insulating layer for defining at least one channel, and a coil structure defined by a conductive material situated in the at least one channel. Claim 25 further requires that a profile of the channel includes a first segment defining a first angle and a second segment continuous with the first segment, the second segment defining a second angle, the second angle being different than the first angle.

To anticipate the claims, the rejection points to Rose's insulating layer 70 as meeting the claimed insulating layer, and the photoresist layer 82 as meeting the claimed photoresist layer. The rejection goes on to indicate that Rose's photoresist layer 82 defines at least one channel, and that Rose discloses a coil structure 20b defined by a conductive material situated in the channel, where a profile of the channel includes a first segment (marked on the drawing) and a second segment (marked on the drawing).

In a response to the final Office Action, Applicants argued that, looking to the marked-up version of Rose's FIG. 3, above, the first segment marked by the Examiner is not defined by the photoresist layer 82, but rather is defined by insulating layer 70. Thus, the first segment indicated by Rose does not anticipate the first segment of claim 25, as Rose's first segment is defined by insulating layer 70 rather than by a photoresist layer as claimed. The Examiner responded in the Advisory Action of 12/05/2005 that the insulation layer 70 is made of an organic material, and

that it is well known in the art that the organic material used in the art for forming an insulation layer is photoresist.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The elements must be arranged as required by the claim. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Moreover, the identical invention must be shown in as complete detail as contained in the claim. *Richardson v. Suzuki Motor Co.* 868 F.2d 1226, 1236, 9USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants believe that the rejection of claim 25 is erroneous, as Rose fails to disclose each and every claim limitation as required by *Verdegaal Bros.*, *supra*. Claim 25 requires an insulating layer and a photoresist layer positioned adjacent the insulating layer for defining at least one channel, and a coil structure situated in the at least one channel. Referring to Rose's FIG. 3 (shown above), Applicants note that the “channel” referred to in the rejection is in reality an encapsulation. The distinction between “channel” and “encapsulation” is discussed in more detail below. With continued reference to Rose's FIG. 3, the purported “channel” is defined by an inorganic insulating layer 80 positioned adjacent insulating layer 70. Rose's resist layer is 82 is spaced from the coil structure 20b, and so could not define a channel in which the coil structure 20b is situated, as it is added after layers 70 and 80. Thus, Rose fails to disclose each and every limitation of claim 25, namely the limitation requiring an insulating layer and a photoresist layer positioned adjacent the insulating layer for defining at least one channel, and a coil structure situated in the at least one channel so defined.

Applicants also believe that the rejection of claim 25 is erroneous, as the elements of Rose are not arranged as required by the claim, in violation of the rule of *In re Bond*, *supra*. Again, the purported “channel” in Rose is defined by insulating layer 70 and insulating layer 80, not an insulating layer and a photoresist layer as required by claim 25. Accordingly, the rejection violates the rule of *In re Bond*, *supra*.

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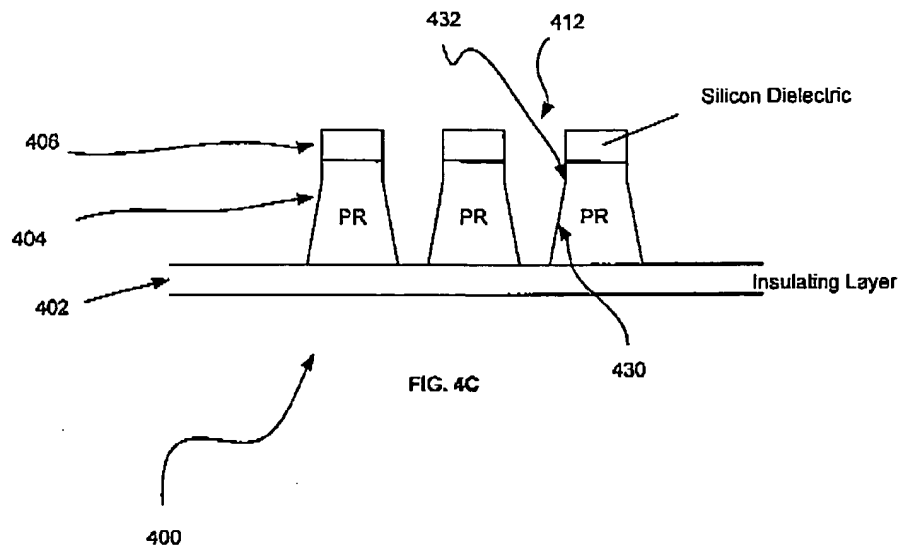
Applicant also argues that the plain meaning of "channel" requires an interpretation thereof that excludes encapsulation. Per MPEP 2111.01, the terms of a claim must also be given their plain meaning unless defined in the specification. In other words, they must be read as they would be interpreted by those of ordinary skill in the art. The Examiner, being one skilled in the art, will appreciate that the word "channel" in the structural sense (as claimed) is universally used in the field of semiconductor processing as meaning a groove or trench with an open top. In sharp contrast, Rose's resist layer 82 encapsulates the coil structure 20b. *See* Rose FIG. 3.

Accordingly, Rose fails to teach each and every limitation of claim 25, namely the limitation of a photoresist layer positioned adjacent the insulating layer for defining at least one channel, in violation of the rule of *Verdegaal Bros, supra*.

Claim 25 also requires that the segments of the channel and their respective angles are defined by the photoresist. This feature is not shown in Rose, in violation of the rule of *Verdegaal Bros, supra*. That the claimed channel segments are defined by the photoresist is implicit in the language of the claim. Further, as required by MPEP Section 2111, the Examiner must give the claims their broadest reasonable interpretation in light of the specification. Referring to the present application, the head structure described in the specification includes channels 412 defined by the photoresist layer 410. Each channel defined by the photoresist layer has multiple segments 430, 432. Note the following quote from p. 11, lines 1-6 and related Figure 4C of the present application:

As shown, the channels 412 include multiple segments each defining different wall angles, in order to overcome the deficiencies of the prior art and improve the aspect ratios of a resultant coil structure. In particular, each channel 412 includes a first segment 430 defining a first angle and a second segment 432 defining a second angle. The first segment 430 of each channel 412 may be positioned below the corresponding second segment 432.





The specification clearly indicates that the channel segments 430, 432 are defined by the photoresist layer. Therefore, it would not be reasonable to equate Rose's first segment defined by an insulating layer 70 with the first segment defined by the photoresist layer of the claimed invention, in light of the specification.

The embodiment of claim 25 provides an advantage over structures such as those disclosed in Rose. By defining the channel segments with the photoresist layer, a high aspect ratio can be achieved without the problems associated with milling the structure to define the coil structure, e.g., shorting.

Further, the photoresist structures having the angles claimed in claims 27-30 provide an additional benefit in that they are more stable, i.e., less prone to breaking or tipping over during processing.

Therefore, it is Applicant's contention that not all claimed elements are overtly disclosed in Rose. Accordingly, because all features of claim 25 are not present in Rose, it appears that the Examiner may be implying that the undisclosed features are inherently present. However, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326

(CCPA 1981). Rather, to establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

Applying these rules to the present application, the lack of any indication of how the claimed features not literally disclosed in Rose are inherently present renders the rejection of claim 25 inappropriate.

Claims 26-30 and 32-34 depend from claim 25 and therefore incorporate the limitations of claim 25, and are therefore also believed to be allowable over Rose by virtue of their dependence. Claims 36 and 37 contain limitations similar to those of claim 25, and so are believed to be allowable for the same reasons as claim 25.

Because Rose fails to disclose or inherently contain each and every limitation required by claims 25-30, 32-34, 36 and 37, and because the rejection fails to provide a basis for inclusion of inherent features in the rejection, the rejection of claims 25-30, 32-34, 36 and 37 is improper.

Group #2: Claim 31

In the final office action, the Examiner rejected claim 31 over Rose. Claim 31 depends from claim 25 and therefore incorporates the limitations of claim 25, and is therefore also believed to be allowable over Rose by virtue of its dependence.

In addition, Applicants believe that the rejection of claim 31 is erroneous, as Rose fails to disclose each and every claim limitation as required by *Verdegaal Bros., supra*. In addition to the limitations of parent claim 25, claim 31 requires that the second segment of the channel is substantially vertical and defines an angle that is between 80 and 90 degrees, and the first segment defines an angle that is between 70 and 85 degrees.

Referring to FIG. 3 of Rose, relied on in the rejection, Applicants note that if the second segment identified by the Examiner is substantially vertical and defines an angle that is between 80 and 90 degrees, then the first segment identified by the Examiner cannot be between 70 and 85 degrees as required by the claims. Rather, the first segment appears to define an angle of less than 45 degrees, which is far outside the range claimed. Accordingly, Rose fails to disclose a first segment defining an angle that is between 70 and 85 degrees.

The embodiment of claim 31 provides an advantage over structures such as those disclosed in Rose. By defining the channel segments with the photoresist layer, a high aspect ratio can be achieved without the problems associated with milling the structure to define the coil structure, e.g., shorting. Further, the channel segments having the angles required by claim 31 provides an additional benefit in that they are more stable, i.e., less prone to breaking or tipping over during processing.

Nor is there any indication that the limitations of claim 31 are inherently present.

Because Rose fails to disclose or inherently contain each and every limitation required by claim 31, and because the rejection fails to provide a basis for inclusion of inherent features in the rejection, the rejection of claim 31 is improper.

Issue #2:

Issue # 2: Claim 35 has been rejected under 35 USC 103(a) as being unpatentable over the combination of Rose et al. with Hsiao et al. (US 6,570,739) [hereinafter "Hsiao"].

Group #1: Claim 35

The analysis of obviousness was set forth in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966). In order to establish a *prima facie* case of obviousness, three basic criteria must be met [the *Graham* test]:

First, there must be some *suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of the references. Second, there must be a *reasonable expectation of success*. Finally, the prior art reference or combined references must teach or suggest *all the claim limitations*. *The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art*, and not based on applicant's disclosure (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991; emphasis added).

Claim 35 requires that the aspect ratio of the channel and coil structure is at least 2.5. Applicants respectfully assert that the rejection fails the first prong of the *Graham* test, namely that there is insufficient suggestion or motivation to combine the prior art references and modify Rose based on Hsiao as suggested in the rejection.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432. In the instant case, Rose indicates that conductor 22b, the only conductor near the photoresist 82, is preferred to be larger than the lower conductor 22a. *See* Rose [0042]. Further, Rose's wider upper conductor lowers winding inductance and improves rise time, thereby improving operating frequency. *See* Rose paragraph [0045]. Accordingly, the addition of Hsiao's high aspect ratio coils would provide no additional benefit. Further, the motivation for adding Hsiao's high aspect ratio coils as cited by the Examiner is already provided by the upper conductor 22b as stated in Rose [0045], and so there is no motivation to replace Rose's upper conductor 22b with Hsiao's coils.

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Applicants also argue that Rose teaches away from the high aspect ratio coils of Hsiao. It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Again, Rose [0042] indicates that the upper conductor 22b, the only conductor near the photoresist 82, is preferred to be larger than the lower conductor 22a. Rose [0044] goes on to indicate that the wider upper conductor 22b minimizes the combined height of the upper and lower conductors 20a and 20b. This improves yoke material deposition and improves operating frequency. Thus, Rose teaches away from high aspect ratio conductors in order to minimize the combined height of the upper and lower conductors 20a and 20b. Accordingly, the rejection violates the rule of *In re Grasselli, supra*.

In view of the remarks set forth hereinabove, all of the independent claims are deemed allowable, along with any claims depending therefrom.

**VIII APPENDIX OF CLAIMS (37 C.F.R. § 41.37(c)(1)(viii))**

The text of the claims involved in the appeal (along with associated status information) is set forth below:

1. (WITHDRAWN) A process for manufacturing a coil structure for a magnetic head, comprising:
  - depositing an insulating layer;
  - depositing a photoresist layer on the insulating layer;
  - depositing a silicon dielectric layer on the photoresist layer;
  - masking the silicon dielectric layer;
  - reactive ion etching at least one channel in the silicon dielectric layer;
  - reactive ion etching at least one channel in the photoresist layer and the silicon dielectric layer, wherein the channel includes a first segment defining a first angle and a second segment defining a second angle;
  - depositing a conductive seed layer in the channel;
  - filling the channel with a conductive material to define a coil structure; and
  - chemical-mechanical polishing the conductive material and the conductive seed layer for the planarizing thereof.
2. (WITHDRAWN) The process as recited in claim 1, wherein the first segment of the channel is positioned below the second segment of the channel.
3. (WITHDRAWN) The process as recited in claim 2, wherein the first segment defines a beveled angle.
4. (WITHDRAWN) The process as recited in claim 3, wherein the first segment defines an angle between 70 and 85 degrees.
5. (WITHDRAWN) The process as recited in claim 2, wherein the second segment defines an angle that is substantially vertical.

6. (WITHDRAWN) The process as recited in claim 5, wherein the second segment defines an angle between 80 and 90 degrees.
7. (WITHDRAWN) The process as recited in claim 6, wherein the first segment defines an angle between 70 and 85 degrees.
8. (WITHDRAWN) The process as recited in claim 1, wherein the reactive ion etching includes  $H_2/N_2/CH_3F/C_2H_4$  reducing chemistry.
9. (WITHDRAWN) The process as recited in claim 8, wherein the reducing chemistry includes  $H_2/N_2/CH_3F/C_2H_4$  gas ratios of 50-100/100-200/1-3/1-10.
10. (WITHDRAWN) The process as recited in claim 8, wherein the reducing chemistry includes a pressure range of 5 to 20mTorr.
11. (WITHDRAWN) The process as recited in claim 8, wherein the reducing chemistry includes a temperature range of -30 to 0°C.
12. (WITHDRAWN) The process as recited in claim 8, wherein the reactive ion etching is carried out by an inductively coupled plasma system with a coil power including 900 to 1500 watts.
13. (WITHDRAWN) The process as recited in claim 1, wherein the reactive ion etching is carried out by an inductively coupled plasma system with a radio frequency (RF) power including 100 to 200 watts.
14. (WITHDRAWN) The process as recited in claim 1, wherein the reactive ion etching is carried out by an inductively coupled plasma system with a magnitude of a radio frequency (RF) bias including about 120V.

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15. (WITHDRAWN) The process as recited in claim 1, wherein the photoresist is hard-baked.
16. (WITHDRAWN) The process as recited in claim 1, wherein the conductive seed layer includes at least one of Cu, Ta, and TaN.
17. (WITHDRAWN) The process as recited in claim 1, wherein the conductive material includes Cu.
18. (WITHDRAWN) The process as recited in claim 1, wherein the silicon dielectric layer includes at least one of  $\text{SiO}_2$  and  $\text{Si}_3\text{N}_4$ .
19. (WITHDRAWN) The process as recited in claim 1, wherein an aspect ratio of the channel is at least 2.5.
20. (WITHDRAWN) The process as recited in claim 1, wherein the masking includes depositing another photoresist layer including an imaging photoresist layer.
21. (WITHDRAWN) The process as recited in claim 1, and further comprising removing at least part of the silicon dielectric layer.
22. (WITHDRAWN) The process as recited in claim 21, wherein the silicon dielectric layer is removed by chemical-mechanical polishing (CMP).
23. (WITHDRAWN) The process as recited in claim 1, and further comprising depositing an adhesion promoter layer between the silicon dielectric layer and the imaging photoresist layer.
24. (WITHDRAWN) The process as recited in claim 1, wherein the reactive ion etching includes  $\text{CF}_4/\text{CHF}_3$  chemistry.



25. (PREVIOUSLY PRESENTED) A magnetic head, comprising:  
an insulating layer;  
a photoresist layer positioned adjacent the insulating layer for defining at least one channel; and  
a coil structure defined by a conductive material situated in the at least one channel;  
wherein a profile of the channel includes a first segment defining a first angle and a second segment continuous with the first segment, the second segment defining a second angle, the second angle being different than the first angle.
26. (ORIGINAL) The magnetic head as recited in claim 25, wherein the first segment of the channel is positioned below the second segment of the channel.
27. (ORIGINAL) The magnetic head as recited in claim 26, wherein the first segment defines a beveled angle.
28. (ORIGINAL) The magnetic head as recited in claim 27, wherein the first segment defines an angle between 70 and 85 degrees.
29. (ORIGINAL) The magnetic head as recited in claim 26, wherein the second segment defines an angle that is substantially vertical.
30. (ORIGINAL) The magnetic head as recited in claim 29, wherein the second segment defines an angle between 80 and 90 degrees.
31. (ORIGINAL) The magnetic head as recited in claim 30, wherein the first segment defines an angle between 70 and 85 degrees.
32. (ORIGINAL) The magnetic head as recited in claim 25, wherein the reactive ion etching includes  $H_2/N_2/CH_3F/C_2H_4$  reducing chemistry.

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33. (ORIGINAL) The magnetic head as recited in claim 25, wherein the photoresist is hard-baked.
34. (ORIGINAL) The magnetic head as recited in claim 25, wherein the conductive material includes Cu.
35. (ORIGINAL) The magnetic head as recited in claim 25, wherein an aspect ratio of the channel and coil structure is at least 2.5.
36. (PREVIOUSLY PRESENTED) A magnetic head manufactured utilizing a process, comprising:
- depositing an insulating layer;
  - depositing a photoresist layer on the insulating layer;
  - depositing a silicon dielectric layer on the photoresist layer;
  - masking the silicon dielectric layer;
  - reactive ion etching a plurality of channels in the silicon dielectric layer using  $\text{CF}_4/\text{CHF}_3$  chemistry;
  - reactive ion etching a plurality of channels in the photoresist layer and the silicon dielectric layer, wherein the channels each include a first segment defining a first angle and a second segment defining a second angle, the first and second segments being contiguous wherein a  $\text{H}_2/\text{N}_2/\text{CH}_3\text{F}/\text{C}_2\text{H}_4$  reducing chemistry is utilized in channel formation;
  - depositing a conductive seed layer in the channels;
  - electroplating the channels with a conductive material to define a coil structure; and
  - chemical-mechanical polishing the conductive material and the conductive seed layer for the planarizing thereof.
37. (PREVIOUSLY PRESENTED) A disk drive system, comprising:
- a magnetic recording disk;
  - a magnetic head including:
    - an insulating layer,

a photoresist layer positioned adjacent the insulating layer for defining at least one channel, and

a coil structure defined by a conductive material situated in the channel,

wherein the channel and coil structure include a first segment defining a first angle and a second segment defining a second angle, the first and second segments being contiguous;

an actuator for moving the magnetic head across the magnetic recording disk so the magnetic head may access different regions of the magnetic recording disk; and

a controller electrically coupled to the magnetic head.

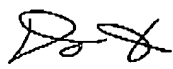
**IX APPENDIX LISTING ANY EVIDENCE RELIED ON BY THE APPELLANT IN THE  
APPEAL (37 C.F.R. § 41.37(c)(1)(ix))**

There is no such evidence.

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In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-2587 (Order No. HSIJ9-2003-0045US1).

Respectfully submitted,

By:   
Dominic M. Kotab  
Reg. No. 42,762

Date: 3/20/06

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